

# **EXHIBIT 1**

## **PUBLIC REDACTED VERSION**

1 UNITED STATES DISTRICT COURT  
2 NORTHERN DISTRICT OF CALIFORNIA  
3 SAN FRANCISCO DIVISION

4 -----X  
5 IN RE GOOGLE PLAY STORE  
6 ANTITRUST LITIGATION  
7 Case No. 3:21-md-02981-JD

8 THIS DOCUMENT RELATES TO:  
9 Epic Games Inc. v. Google LLC, et al.,  
10 Case No. 3:20-cv-05671-JD

11 In Re Google Play Consumer  
12 Antitrust Litigation  
13 Case No. 3:20-cv-05671-JD

14 In Re Google Play Developer  
15 Antitrust Litigation,  
16 Case No: 3:20-cv-05792-JD

17 State of Utah, et al., v.  
18 Google LLC, et al.,  
19 Case No: 3:21-cv-05227-JD

20 -----X

21 VIDEOTAPE DEPOSITION  
22 HAL SINGER, PH.D.  
23 Thursday, May 12, 2022  
24 9:07 a.m. (EST)

25 Reported by:  
Ryan K. Black, RPR, CLR, Notary Public

1 developers are passing through savings in order  
2 to induce customers to switch to the -- and  
3 download the app from the developer's website.

4 So it's not just theory. I mean,  
5 obviously, theory is on my side; but I think we  
6 have -- we have good evidence to bear as well.

7 Q. But you would agree that standard  
8 economic theory tells us that developers would  
9 have incentives to respond to lower service fees  
10 by reducing their prices?

11 A. Correct.

12 Q. Okay. And standard economics also  
13 tells us that competition drives firms to make  
14 competitive investments in product quality,  
15 right?

16 A. Yes. I believe that, as I said, that  
17 in -- in a but-for world with lower take rates  
18 and this new-found cash flow that the developers  
19 would enjoy, not all of it is going to go into  
20 the pockets of the owners. But -- but some of  
21 that will be reinvested and -- and -- and in  
22 services and features that -- that make the app a  
23 better experience for the user.

24 Q. Right. So standard economics would give  
25 developers an incentive to respond to lower

1 service fees by reducing prices and improving  
2 quality?

3 A. Correct.

4 Q. Now, in your reports, do you have any  
5 model that will tell the Court or the jury which  
6 developer will follow the incentives to improve  
7 quality and which developer will follow the  
8 incentives to reduce price?

9 A. Well, I think all developers will reduce  
10 price. My opinion on quality is that it would  
11 happen at a -- at a general level, but that is  
12 not my proof of impact. My proof of impact turns  
13 on the price response.

14 Q. Have you done any analysis to determine  
15 whether any developer would improve the -- the  
16 quality of their app in a world with reduced  
17 service fees?

18 A. I don't think I've done analysis.  
19 I'm -- I'm aware of some testimony, and we'd have  
20 to go into my footnotes of developers testifying  
21 that they would do something to that effect. But  
22 I -- that's more me just citing a developer than  
23 -- you know, than doing -- I took your question  
24 to mean original analysis, like trying to model  
25 the quality dimension. I don't do that.

1 impression here. It does account for the  
2 differentiated nature of the products within the  
3 category that it faces. And so the extent that  
4 that differentiation is driven in part by quality  
5 differences across apps within a category, it  
6 does. It does account for it.

7 But -- but I'm taking your question to  
8 mean -- I'm still going back, and I'll just say  
9 it again, that I don't have a separate model  
10 apart from the model that -- that you're aware of  
11 that -- that -- that attempts to measure changes  
12 in quality enhancements by apps in a but-for  
13 world, you know, absent the restraints.

14 Q. But, in fact, the model you have  
15 regarding the alleged reduction in prices doesn't  
16 measure the amount that any developer will invest  
17 in quality either, right?

18 A. It -- so to be careful, it -- it  
19 measures -- by -- by taking into account the  
20 differentiation among apps in -- in the same  
21 category, it takes -- it takes quality into  
22 account. But whether or not it -- it seek -- it  
23 does not seek to measure changes in quality that  
24 would come about from a more competitive  
25 landscape.

1 Q. And -- and it doesn't measure whether  
2 any developer would actually invest, or how much  
3 they would invest, in improving the quality of  
4 their app in the but-for world.

5 A. I think that's fair. Just to be clear,  
6 I don't seek to measure the change in investment  
7 and -- and quality in the but-for world.

8 Q. Now, your analysis of a potential  
9 but-for world assumes entry by a rival app store  
10 platform that has a comparable number and quality  
11 of apps as the Play Store.

12 A. I -- I don't think I'm ever that  
13 explicit in -- in the offerings of the rival.  
14 But what I will tell you it -- it turns on, and  
15 we're talking about the Rochet-Tirole model, the  
16 -- the one in the app distribution market, just  
17 to be clear. Is that -- can we -- can we speak  
18 to that one? I -- I'm prepared to speak to that  
19 one, at least, and to answer this question,  
20 'cause you talked about a rival app store.

21 Q. Well, does -- do diff -- do different  
22 versions of your model assume different rivals in  
23 the but-for world?

24 A. Absolutely. So remember I -- I've --  
25 I've got a model for the app distribution market

1 traffic to alternative app stores, you looked  
2 at what developers did in the actual world.

3 MS. GIULIANELLI: Objection to form.

4 THE WITNESS: In part. I -- I look at  
5 what developers did or try to do in the actual  
6 world. I look at the fact that there's a lawsuit  
7 that is largely about the anti-steering rules.  
8 I look at the -- the economic literature on  
9 steering. Also, just there's economic meaning  
10 in -- we -- in the -- the most effective  
11 distribution path. You know, when we -- I've  
12 done exclusive dealing cases before and we're  
13 always focused on what channel got shut out and  
14 was it -- was it the most efficient distribution  
15 channel? I'm sure you're aware of this.

16 And -- and I think that being able to  
17 communicate to the -- to your customers that  
18 there are lower cost alternatives outside of the  
19 Play Store. When they're in the Play Store, or  
20 when they're in your app, is the most efficient  
21 way.

22 BY MR. RAPHAEL:

23 Q. Have you estimated the cost of any  
24 mechanism for driving traffic to alternative app  
25 stores for any developer other than steering?

1 MS. GIULIANELLI: Ob -- ob -- ob --  
2 objection.

3 THE WITNESS: I haven't estimated, but I  
4 can -- I can tell you that if you go out and buy  
5 a billboard on a highway, right, and you -- we  
6 could go look at the billboard price, right, but  
7 it -- I don't think you need to do an empirical  
8 assessment of the traffic generation of a  
9 billboard vis-à-vis communicating to your  
10 customer within the app while you've got the  
11 customer's attention that, Hey, if you go outside  
12 and -- and download my app from an alternative  
13 store or an alternative -- or consummate the  
14 transaction through an alternative processor,  
15 there's no doubt that that would be the more  
16 potent or effective means of communication.

17 BY MR. RAPHAEL:

18 Q. You haven't done any empirical  
19 analysis of which method of driving traffic to an  
20 alternative app store is most efficient for any  
21 developer, correct?

22 A. I have not sought to estimate the  
23 returns to investing in billboards, I have not  
24 sought the returns to investing in television  
25 advertising for -- for Internet transactions,



1 and I've not sought to estimate the returns to  
2 investing -- oh, I'm trying to think where else  
3 you can do it --

4 Q. Well, you haven't -- you haven't -- you  
5 haven't estimated the returns to investing of any  
6 kind of advertising for any developer, correct?

7 A. I think it's fair to say that I have not  
8 -- I have not considered the return to these  
9 alternative advertising channels. But I also  
10 point out that the fact that Google does not fret  
11 about the developer advertising there implies  
12 that Google was concerned about blocking the most  
13 efficient distribution channel. That's what the  
14 case is about.

15 Q. Okay. Now, do you know -- some  
16 developers steer in the actual world, correct?

17 A. Some do. Very few, but, yes, some do.

18 Q. All right. Have you estimated how -- in  
19 your reports how many more developers would have  
20 to steer in the but-for world to pressure Google  
21 to reduce service fees?

22 MS. GIULIANELLI: Objection to the form.

23 THE WITNESS: The -- the model does not  
24 require me to come up with the estimate of the  
25 amount who would steer, no. Just a sufficient

1     Android. I took your question to mean for the  
2     phone -- for the production of a phone.

3           Q.     Well, isn't the Android operating system  
4     an input into the production of the phone?

5           A.     It is. It is an input into the  
6     production of the phone, yes.

7           Q.     Okay. So if Google offers OEMs a  
8     negative price for And -- the Android operating  
9     system in the form of -- or as the -- the -- the  
10    revenue-share agreements, wouldn't that be  
11    equivalent to a reduction in the marginal cost of  
12    producing the phone?

13          A.     I -- I'd -- I'd have to think about  
14    that. It's not how I would explain it, you know,  
15    to a economics class. Put it that way. I see it  
16    as a -- as a source of revenue, not a -- not a  
17    -- not a -- not -- not entering the cost  
18    function.

19          Q.     Okay. Now, your opinion is that every  
20    developer that would have paid lower service fees  
21    in the but-for world would have also reduced  
22    prices, correct?

23          A.     That's correct.

24          Q.     Okay. And that's what your pass-through  
25    formula that you've provided in your report

1 predicts.

2 A. Correct.

3 Q. Okay. And you're aware, aren't you,  
4 that developers choose the category for their app  
5 when they list it in Google Play?

6 A. Yes.

7 Q. Now, in your reports, have you  
8 calculated or estimated the marginal cost of  
9 supplying an additional app subscription or  
10 in-app purchaser for any developer?

11 A. I haven't estimated the marginal cost,  
12 but I have cited record evidence and economic  
13 literature establishing that they do, in fact,  
14 incur marginal costs. And I -- I also have the  
15 opinion that processing payments are marginal  
16 cost, and I also have the opinion that the take  
17 rate is a marginal cost. So I --

18 Q. Okay.

19 A. -- leave it at that.

20 Q. Okay. So in your reports, though, you  
21 haven't calculated or estimated the marginal cost  
22 of supplying an additional app subscription or  
23 in-app purchase for any developer.

24 A. No. And the models don't call for that.  
25 The -- at least in the short run, all the models

1 require is that they face a positive marginal  
2 cost, and I'm confident they do.

3 Q. All right. So the pass-through formula  
4 you've used in your reports doesn't actually  
5 depend on what the marginal cost of the developer  
6 is.

7 MS. GIULIANELLI: Objection.

8 THE WITNESS: That's fair.

9 Do you want to -- I think we're an hour  
10 and a half in?

11 MS. GIULIANELLI: You want to --

12 MR. RAPHAEL: Happy to take a break.

13 MS. GIULIANELLI: -- a break?

14 THE WITNESS: Okay. Yes.

15 THE VIDEOGRAPHER: Please stand by.

16 We're now off the record. The time is  
17 10:40 a.m.

18 (Recess taken.)

19 THE VIDEOGRAPHER: We're now on the  
20 record. The time is 10:50 a.m.

21 BY MR. RAPHAEL:

22 Q. Dr. Singer, have you put forth any  
23 method in your reports to determine what each  
24 developer's marginal costs are, other than  
25 service fees?

1           A.     Well, other than the service fees  
2     and the processing fees, I haven't estimated  
3     precisely the marginal costs. But I have studied  
4     the issue of whether they do incur other marginal  
5     costs, and I've come to the conclusion that they  
6     do; and I cite record evidence in economics  
7     articles.

8           Q.     And so economics articles would be a  
9     good source to determine what the marginal costs  
10    for the developers are other than the service  
11    fees and transaction fees?

12          A.     For identifying the categories of  
13    marginal costs but not to -- not to estimate  
14    precisely what -- what it is in, say, percentage  
15    terms.

16          Q.     Okay. Now, your opinion is that  
17    acquiring an app -- strike that.

18                 Your opinion is that downloading an  
19    app and making in-app purchases are separate  
20    transactions involving separate products.

21          A.     I wouldn't quite put it that way. I  
22    would say that the -- the services that are being  
23    offered in the in-app for -- in support of in-app  
24    transactions are different. It's a different  
25    suite of services than the services being offered

1 consumer is complete?

2 A. Certainly not the sales costs.  
3 Certainly not the processing fee. Certainly not  
4 the take rate.

5 Q. How about the other costs that you've  
6 listed here in your report?

7 A. It's possible that some of those other  
8 marginal costs identified by Ghose and Han would  
9 occur subsequent to -- to a particular  
10 transaction, --

11 Q. Okay.

12 A. -- but could still be considered as  
13 variable costs in the sense that they rise  
14 with -- with output.

15 Q. Okay. Could the marginal cost to a  
16 developer of supplying an additional in-app  
17 purchase vary from developer to developer?

18 A. Sure.

19 Q. And could some developers have zero  
20 marginal costs for an in-app purchase?

21 A. No.

22 Q. Could you go to Page 153 of your report?

23 A. You must mean my initial report  
24 because --

25 Q. Correct.

1           A.     -- the reply is not -- okay.

2                     Page 153?

3           Q.     Yes, sir.

4           A.     Okay.

5           Q.     Do you see there second from the top  
6     there's an article by Avi Goldfarb and Catherine  
7     Tucker called "Digital Economics"?

8           A.     Yes.

9           Q.     So that's an article that you've relied  
10    on in your report?

11          A.     Yes.

12          Q.     Are you familiar with that article?

13          A.     In part, yes.

14          Q.     Okay. Do you know if that article says  
15    anything about what marginal costs might be for a  
16    digital good?

17          A.     No. But if it were just a digital good,  
18    I think that might be too broad of a category.  
19    We're talking about in-app transactions here.

20                 MR. RAPHAEL: I'm going to mark this as  
21    Exhibit 335.

22                     (Exhibit No. 335, an article titled  
23    Digital Economics by Avi Goldfarb and Catherine  
24    Tucker, was introduced electronically.)

25                 THE REPORTER: Here you go, sir.

1 THE WITNESS: Thanks.

2 BY MR. RAPHAEL:

3 Q. Do you see Exhibit 335, Dr. Singer?

4 A. I do.

5 Q. And what is it?

6 A. It -- it appears to be the article that  
7 I cited.

8 Q. That's the "Digital Economics" article  
9 by Tucker and Goldfarb?

10 A. Yes.

11 Q. And -- and could you go to Page 12 of  
12 the article?

13 A. If you'd let me just -- one second. I'd  
14 -- I'd like to just read the abstract quickly.

15 Q. Would you go to Page 12, please?

16 A. Hold on one second.

17 Okay. Page 12.

18 Okay.

19 Q. Do you see at -- further down, say,  
20 two-thirds of the way down in the left column,  
21 there's a header that says, "The replication cost  
22 of digital goods is zero"?

23 A. Yes.

24 Q. So this article that you relied on in  
25 your report says that "The replication costs of



1 digital goods is zero," correct?

2 A. Correct.

3 Q. Now, are you familiar with V-Bucks?

4 A. Oh. Can I put this to the side?

5 Q. For now, yes.

6 A. Yeah.

7 And I would just note for the record  
8 that replication costs and marginal costs are not  
9 the same.

10 Q. Well, how are they different?

11 A. Oh. What -- what Goldfarb is not taking  
12 into consideration here is that to sell the extra  
13 unit you have to pay a processing fee. That's a  
14 marginal cost.

15 So it's true that to create the next  
16 sword -- the 150th sword doesn't cost any more to  
17 replicate that sword, but that doesn't mean there  
18 aren't any marginal costs incurred in the  
19 transaction.

20 Q. Understood.

21 All right. Could some developers have  
22 negative marginal costs for in-app purchases?

23 A. It's hard to -- to fathom that.

24 Q. What if a developer generates  
25 advertising revenue as the result of an in-app

1           Can you give any examples of marginal  
2 costs that would be included in the short run, as  
3 you defined it, for a developer but would not be  
4 included in the long run, as you define it?

5           A.     Oh, no, no. It doesn't work that way,  
6 right?

7           As you move to the long run, the  
8 categories expand. So everything -- every kind  
9 of cost that would be considered marginal in the  
10 short run, would also be considered marginal or  
11 variable in the long run.

12          Q.     Okay. Now, pass-through rates are the  
13 ratio of the dollar change in the developer's  
14 profit-maximizing price that results from a  
15 dollar change in marginal cost.

16          A.     Can I just hear it back just to make  
17 sure?

18          Q.     The pass-through rate is a ratio of a  
19 dollar change in a developer's profit-maximizing  
20 price that results from a dollar change in the  
21 developer's marginal cost.

22          A.     I think that that is a fair way to put  
23 it, yes.

24          Q.     Okay. And so any formula for the  
25 pass-through rate should account for the

1 relationship between a change in the marginal  
2 cost and prices.

3 A. Not necessarily.

4 Q. So -- well, I just want to be -- I don't  
5 think I'm saying anything controversial. The --  
6 the -- the pass-through rate is trying to measure  
7 the relationship between how a marginal cost  
8 changes and how a price changes.

9 A. Correct.

10 Q. Right. The effect of the change in  
11 marginal cost on the price.

12 A. Correct.

13 Q. Okay. Now, Google's service fee is  
14 what an economist would call "an ad valorem fee,"  
15 correct?

16 A. I think that's fair.

17 Q. And an ad valorem fee is one that is  
18 calculated based on a percentage of the price  
19 that is charged?

20 A. Correct.

21 Q. Okay. And sales taxes often are ad  
22 valorem fees as well. They're a percentage of  
23 the price?

24 A. Yes. And as I said earlier, we see  
25 changes in sales prices -- in -- in sales taxes

1 being reflected in the prices of apps in the  
2 transaction data.

3 Q. Right. And your opinion is that  
4 Google's service fees, to the extent that they  
5 are supercompetitive, is equivalent to an  
6 increase in the developer's marginal cost.

7 A. It can be understood that way, yes.

8 Q. Right. And in your report, you've  
9 modeled the proper economic way to calculate how  
10 a profit-maximizing developer would set prices  
11 based on marginal costs.

12 A. I have. And --

13 Q. Right.

14 A. -- and, as you know, it depends on  
15 the -- the nature of the demand and the demand  
16 specification that you assume, right? Each  
17 demand specification you assume is going to apply  
18 at different pass-through rates.

19 Q. Right. So could you go to Page 104 of  
20 your report, your opening report, please?

21 A. Sure.

22 Q. And you'll see this is a continuation of  
23 the Paragraph 225 from the previous page.

24 And you've got a formula there that has  
25 "P minus C star divided by P equals one divided

1 by E sub D."

2 Do you see that?

3 A. Yes. That's the classic Lerner markup.

4 Q. Right. So that's -- that's the proper  
5 economic model for how a profit maximizing  
6 developer would set prices based on marginal  
7 costs, right?

8 A. That model describes the markup over  
9 marginal cost as the function of the elasticity  
10 of demand faced by the developer.

11 Q. Right. And -- and this model on Page  
12 104 of your opening report, that -- that's --

13 A. So --

14 Q. -- the correct economic mod -- economic  
15 way to model how the change in marginal costs  
16 will affect the price that the developer charges.

17 A. It's the -- it's the way to think  
18 about it at -- at a very, very high level of  
19 abstraction. But, as you know, to actually  
20 estimate the pass-through rate here, I have to  
21 make an assumption about the demands curve and --  
22 and -- and the precise nature of demand that a --  
23 the developer faces, right?

24 Once you --

25 Q. Understood.

1           A.     -- make a -- once you make that  
2     decision, you get these pass-through rules,  
3     right? And the pass-through rules -- whether you  
4     go linear or logit or -- or constant elasticity  
5     -- are going to express pass-through as a  
6     function of things that do not include the  
7     marginal cost.

8           Q.     Understood. But this formula on Page  
9     104 of your report is the correct economic way to  
10    model the relationship between the developer's  
11    price and the marginal cost in general?

12          A.     Well, I just want to put that caveat in  
13    there. It's the -- it's the -- definitely the  
14    way to think about it and why it's in my  
15    preamble, right?

16                 But when I go to model the precise  
17    amount of pass-through, I have to make an  
18    assumption about what kind of demand the  
19    developer faces, right? And that -- that puts  
20    me to a -- takes me to a pass-through rule that  
21    isn't necessarily going to be denominated in  
22    terms of costs.

23          Q.     Understood. So -- but -- but this mod  
24    -- this economic model you've described in Page  
25    104 of your report, that's generally accepted in

1 economics.

2 A. Yes.

3 Q. Now, if you just look at the cost term  
4 there, C star, and the -- the C star in that  
5 formula that you have on Page 104 of your report  
6 is equal to C divided by one minus T, right?

7 A. Correct.

8 Q. And -- and in that -- in that cost term  
9 I just described, T is the service fee rate?

10 A. Correct.

11 Q. And C is the developer's per-unit  
12 marginal cost other than the service fee?

13 A. Correct. Processing and the like, yes.  
14 Any other --

15 Q. Okay.

16 A. Any other types of marginal costs.

17 Q. Okay. And so one input into the  
18 generally accepted economic model of how the  
19 profit-maximizing developer would set pri --  
20 prices is the marginal costs other than the  
21 service fee.

22 A. For short-run profit maximization, the  
23 answer is, yes, that this model, at this high  
24 level of ab -- of abstraction, is a function of  
25 the marginal cost.

1 Q. Right. And in terms of how the price is  
2 a function of mar -- of --of -- of marginal cost,  
3 the -- the -- the formula you've got here on Page  
4 104, in that formula, the effect of a change in  
5 the service fee -- let me -- let me put it  
6 differently.

7 The formula you've got on Page 104, the  
8 effect on prices will be -- as a result of a  
9 change in the service fee will be proportional to  
10 the marginal costs other than the service fee.

11 A. In -- for short-run profit maximization,  
12 yes. For -- for long-run profit maximization,  
13 this is not -- this is not the -- the way that  
14 you'd get to the effect on price.

15 Q. Okay. Now, -- so let me just ask,  
16 looking at this cost term here, C -- C star, if C  
17 in that formula, which is the marginal cost other  
18 than the service fee, if that's zero, then the  
19 service fee rate will not have any effect on the  
20 ultimate price charged according to this model,  
21 correct?

22 A. Let me just say this: It -- it's --  
23 it's never zero in the real world. But -- but if  
24 you want me to ask -- answer the hypothetical,  
25 counterfactually, if we had -- if we had a zero



1 marginal cost, then by this model, and this model  
2 alone, then in the short run, prices would not  
3 adjust to the take rate.

4 As I explain in my report, there's all  
5 sorts of reasons why we would still, even in that  
6 extreme and counterfactual assumption, would  
7 expect prices to change with the change in the  
8 take rate, including from steering, including  
9 from having to cover all costs in the long  
10 run, --

11 Q. Okay.

12 A. -- including from sticky prices.

13 Q. Okay. Now, let me just ask again,  
14 hypothetically, if that term C, which are the  
15 marginal costs other than the service fee rate  
16 in your formula on Page 104, if that term is  
17 negative, then a reduction in the service fee  
18 rate will actually lead to an increase in the  
19 price that the developer would charge.

20 A. I haven't done that one yet, but I  
21 think you've got the -- the sign correct. If you  
22 multiply, in that example, 1.43 by a negative  
23 cost, I think that there -- there would be a  
24 negative relationship in the short run for this  
25 equation.

1 Remer and Sheu, right?

2 A. Correct.

3 Q. Okay. Now, if -- if we could look at  
4 -- well, let me just ask you: The article you  
5 relied upon for the pass-through formula by  
6 Miller, Remer and Sheu that formula using a  
7 per-unit tax rather than an ad valorem tax,  
8 right?

9 A. No. It's much more general than that.  
10 They are looking at just -- under any logit  
11 demand model, they're asking what is the optimal  
12 pass-through rule when the firms in -- are  
13 competing under the logit model.

14 Q. Could you go to the -- Paragraph 239 of  
15 your report?

16 A. Sure.

17 Q. To the bottom of Page 110.

18 A. Okay.

19 Q. And do you see there you have a  
20 formula that's "M minus Q sub J divided by M"?

21 A. Yes.

22 Q. And that's your formula for the  
23 pass-through rate, correct?

24 A. It -- it is the logit formula. I wish I  
25 had invented it. But it's the logit formula,

1     yes.

2           Q.     Right.  And that's the formula you've  
3     used to calculate pass-through rates in this  
4     case.

5           A.     Correct.

6           Q.     And that formula is derived from  
7     Equation 6 of the Miller, Remer and Sheu article  
8     that you've cited in your report.

9           A.     Correct.

10          Q.     Okay.  Now, let me mark as Exhibit 356  
11     the Miller and Sheu article.

12                     (Exhibit No. 336, a document titled  
13     Economics Letters - Using cost pass-through to  
14     calibrate demand, by Miller, Remer and Sheu, was  
15     introduced.)

16     BY MR. RAPHAEL:

17          Q.     Is Exhibit 356 [sic] the article you've  
18     relied on to derive the pass-through rate formula  
19     you've used in this case?

20          A.     Yes.

21          Q.     Could you go to Page 452 of that  
22     article?

23                     And in the left column just below the  
24     header numbered 2, do you see that there's a  
25     paragraph that begins, "Now suppose that a

1 per-unit tax is levied on each product in the  
2 model"? Do you see that?

3 A. Yes.

4 Q. So the general model of cost  
5 pass-through from the article that you relied on  
6 for your pass-through rate formula assumes a  
7 per-unit tax, correct?

8 A. Well, this is in a different section.  
9 This is in Section 2. I'm looking at Section 3.

10 Q. Is it your testimony, sir, that the  
11 logit demand model in Equation 6 in the Miller,  
12 Sheu and Remer article you relied on for your  
13 pass-through formula includes an ad valorem tax?

14 A. There's no -- there's no tax needed.  
15 This is what the -- this is what the pass-through  
16 rate would be under logit regardless of whether  
17 there's a tax.

18 Q. Sir, my question was whether the formula  
19 -- the Equation 6 from the article you relied  
20 upon for your pass-through formula in your report  
21 assumes an ad valorem tax.

22 A. No. Equation 6 does not assume an ad  
23 valorem tax.

24 Q. Okay.

25 A. No, it does not.

1 incremental cost, we're going to get the  
2 pass-through in this model.

3 Q. Okay. I just want to understand: The  
4 Miller article that you relied on for your  
5 pass-through formula uses a per-unit tax,  
6 correct?

7 A. I've acknowledged that in a prior  
8 section, in Section 2, there is a -- a per-unit  
9 tax assumed. Yes, that is --

10 Q. And --

11 A. -- correct.

12 Q. And how about Equation 6 that is derived  
13 from that general model, which is the equation  
14 you relied on for your pass-through formula?  
15 Does that assume a per-unit tax?

16 A. There's no mention of the per-unit tax  
17 in -- in Part 3, so I don't think that a per-unit  
18 tax is necessary to solve for this pass-through  
19 rate.

20 Q. Your testimony is that the Equation 6  
21 isn't derived from the general model of  
22 pass-through on Page 452?

23 A. I cannot find the per-unit tax mentioned  
24 either in the surrounding text of Part 3 or in  
25 the math. Maybe you could point me to it.

1 Q. Well --

2 A. I -- I think that the way Equation 6  
3 should be interpreted is how prices change in the  
4 logit model given a change in marginal cost,  
5 period.

6 Q. Right. But, sir, you've testified that  
7 to the extent that the -- to the extent that the  
8 price will change -- strike that.

9 You've testified that to the extent that  
10 the service fee is a change in the marginal cost,  
11 it will affect the price of a -- of the  
12 transaction proportional to the other marginal  
13 costs, correct?

14 A. In -- in a very general statement of the  
15 demand model, that is true. But once you go into  
16 -- to the logit, the cost no longer enters into  
17 the pass-through formula.

18 Q. Okay. So let's go -- why don't we go to  
19 Table 5 of your report.

20 A. Okay.

21 Q. And that's on Page 98 of your opening  
22 report.

23 Now, if you look at the top of the  
24 table, this is the actual world, right? And you  
25 see that there you have something called "Google

1 Price," which I think is Google's average service  
2 fee across in-app purchase transactions in the  
3 actual world, correct?

4 A. Yes.

5 Q. And that figure is [REDACTED].

6 A. Correct.

7 Q. Now you say, "In the but-for world,  
8 Google's average service fee will drop to [REDACTED]  
9 for in-app purchases," right?

10 A. Correct.

11 Q. And so the difference there in Google's  
12 service fee on average to developers for in-app  
13 purchases is [REDACTED]?

14 A. Correct.

15 Q. So the reduction in the service fee  
16 between the actual and but-for world on average  
17 that you've calculated for in-app purchases would  
18 be [REDACTED], correct?

19 A. Assuming you're doing the [REDACTED] minus  
20 [REDACTED]?

21 Q. Right.

22 A. That's correct, yes.

23 Q. Okay. Now, that reduction in service  
24 fee will affect the price of the transaction that  
25 is charged to the consumer proportional to other

1 marginal costs, correct?

2 A. I think not in Stage 1 when I do the  
3 logit. It's not -- it's no longer going to  
4 necessarily be proportional. I think that in  
5 Stage 2, when we do a conversion of how we use  
6 the pass-through in the Rochet-Tirole model, we  
7 are taking into account the proportionality.

8 Q. Okay. But in -- in -- the -- the way  
9 that you've done it here in Table 5 is that  
10 you've just taken the pass-through rate of [REDACTED]  
11 percent, which is the average you calculated, and  
12 you've just applied that to the entire reduction  
13 in service fee that you've calculated, right?

14 A. I don't understand the question. Sorry.

15 Q. So, you have consumer savings per  
16 transaction of [REDACTED], right, for in-app purchases  
17 in the but-for world?

18 A. Oh, yes. Yes.

19 Q. Okay. So that's just [REDACTED] percent,  
20 which is the pass-through rate that you've  
21 calculated on average of the reduction in the  
22 service fee of [REDACTED], right?

23 A. Correct.

24 Q. So your model for how prices will be set  
25 in the but-for world for in -- at -- for in-app



1 purchases just assumes that all of the reduction  
2 in service fee will be passed through as a  
3 reduction in marginal cost, at least to the  
4 extent of the pass-through rate, right?

5 A. Not all of it. ■ percent of it.

6 Q. Right. But you haven't done anything  
7 here to reflect the fact that the affect on the  
8 price will be proportional to other marginal  
9 costs, correct? You've just taken the  
10 pass-through rate of ■ percent and applied it to  
11 the reduction in service fee.

12 A. That's correct. For in-app, that is  
13 correct.

14 Q. Okay. And that's reflective of the  
15 general pass-through model you've -- you know,  
16 you've used to calculate and propose to calculate  
17 damages in this case. Table 5 is.

18 A. Well, for -- for the in-app market, yes.  
19 For -- for the treatment in the app distribution  
20 market, it's a little more complicated --

21 Q. Right.

22 A. -- the way that the pass-through rate  
23 enters the calculus.

24 Q. Right. So just -- and just so we're  
25 clear, the -- the method that you've used for

1 then applied the difference in the pass-through  
2 rate from Table 5, you know, you would expect to  
3 get the same results.

4 A. I'm not -- not sure if I'm following.  
5 But I -- but I can say that there are other ways  
6 that you could go from -- from the -- from the  
7 formula in 104, but all of them would require you  
8 to make an assumption about the nature of the  
9 demand.

10 Q. Okay. Could you use the formula in  
11 Paragraph 225 of your report that's on Page 104  
12 to calculate the change in marginal cost for the  
13 developer and then apply the pass-through rate to  
14 that?

15 A. Not really, because it's -- it's  
16 difficult to -- to estimate the change in  
17 marginal cost from the developer's perspective.

18 Q. And that's because you don't know the  
19 other marginal costs.

20 A. Cor -- we don't -- we -- we know of  
21 their existence, but we -- we don't know what  
22 their magnitudes are.

23 Q. Okay. The formula from Miller,  
24 Remer and Sheu that you used to derive your  
25 pass-through formula, that's associated with a

1 Q. Did you calculate them for -- on a de  
2 -- developer -- per-developer basis or a per-app  
3 basis?

4 A. It was at the app level.

5 Q. Okay. And if you'll go to -- again,  
6 back to Paragraph 239 with your pass-through rate  
7 formula.

8 A. Okay.

9 Q. And you have the formula there  
10 "M minus Q sub J divided by M," right?

11 A. Right.

12 Q. And "M" is the size of the market?

13 A. Correct.

14 Q. And "Q sub J" is the number of  
15 transactions involving a particular app.

16 A. Correct.

17 Q. Okay. And the market here, this term  
18 "M," is, essentially, the total number of  
19 transactions of apps in the same category as the  
20 app whose pass-through rate you're trying to  
21 measure.

22 A. Correct.

23 Q. And so basically the formula to  
24 calculate the pass-through rate for any app that  
25 you've put forward is a hundred minus the app

1 share of all transactions in its category.

2 A. Fair.

3 Q. So just by --

4 A. Over -- careful caveat: Over the course  
5 of the class period.

6 Q. Okay.

7 A. We're not going to look at it on a  
8 daily basis. We're not going to look at like  
9 Dr. Burtis. We're not going to look at it on a  
10 monthly.

11 Q. Okay.

12 A. We're doing it over the -- over the  
13 class period, over the database, over the range  
14 of data.

15 Q. Okay. And why do you do it over the  
16 class -- whole class period?

17 A. Because I don't think it makes sense as  
18 an economic matter that a firm is going to be  
19 updating its -- its prices or its pass-through  
20 rates on a daily basis. I think that the  
21 appropriate measure passed through. There's,  
22 basically, going to be too much volatility in the  
23 -- in the share, right? If you literally were to  
24 do it down to the nanosecond, you'd be -- you'd  
25 be getting different pass-through rates at -- at

1 period.

2 BY MR. RAPHAEL:

3 Q. But the pass-through formula you have  
4 would predict changes in the pass-through rate  
5 from week to week or month to month if the share  
6 changes. Fair?

7 A. If one were so inclined to measure it on  
8 -- on a monthly or nanosecond basis, yes, you  
9 could get very strange results.

10 Q. Okay. Could the formula you've got  
11 here, the "M minus Q sub J divided by M," could  
12 that be used to calculate pass-through rates in  
13 any case where you know the unit market share of  
14 an intermediary alleged to have passed on an  
15 overcharge?

16 A. I -- I -- I'd be reluctant to say that  
17 the logit model could be applied to any case.  
18 I'd want to confirm, first, as I did here, that  
19 the logit model does a good job explaining the  
20 relationship between prices and shares, as it  
21 does here.

22 So I think you need some empirical  
23 foundation before applying the logit model.  
24 I think that would be a good -- good practice.

25 Q. Okay. Have you used the formula that

1 you used to calculate pass-through in this case  
2 to calculate pass-through in any other case?

3 A. I do not believe I have. In other  
4 cases, what I'm typically doing is regressing  
5 retail price changes on wholesale price changes.

6 Q. Okay.

7 A. And that -- that's just not available  
8 here.

9 Q. All right. To your knowledge, has  
10 any economist used the formula you've used to  
11 calculate pass-through in this case to calculate  
12 pass-through in some other case?

13 A. I -- I don't -- I don't know enough -- I  
14 can't follow how pass-through is calculated in  
15 every antitrust case. I can tell you that the  
16 logit assumption is one of the most common  
17 assumptions that's used in antitrust cases there  
18 is.

19 Q. But --

20 A. All right?

21 Q. But you're not aware of this formula  
22 being used to calculate pass-through in another  
23 case.

24 A. Oh. Pass-through? Well, the formula  
25 is used to calculate price effects from, say,

1 and straightforward to do. Like, if -- I can't  
2 imagine someone saying, "Oh, the linear model  
3 gives you 0.5 always, so I'm going to publish a  
4 paper and I'm going to show you here's the  
5 implied pass-through rate." I don't think that's  
6 the kind of thing that a journal would be excited  
7 to publish, right?

8 Q. Well, let me ask it this way: Have  
9 you -- have you seen any -- are you aware of  
10 any published paper by an economist in a  
11 peer-reviewed journal that has used the formula  
12 related to logit demand from this Miller article  
13 to calculate pass-through in any industry?

14 A. Just pa -- I'm not. But pass-through  
15 just isn't an area where -- empirical-applied  
16 pass-through rates? I -- I -- I imagine that  
17 the number of publications of -- of implied  
18 pass-through rates, or even -- even observed  
19 directly pass-through rates, is just not fodder  
20 for -- for publication. It's just not -- it's --  
21 it's the kind of thing that an -- that it would  
22 be more likely to come up in an antitrust case  
23 where the economist has to estimate pass-through.

24 Q. Right. But you haven't -- you're just  
25 not aware of any article where an economist has

1 done that in a -- in a peer-reviewed piece.

2 A. I'm not -- I'm not aware of it, no.

3 Q. Okay. Now, you would agree that the  
4 pass-through rate is going to depend on the shape  
5 of the demand curve.

6 A. Sure.

7 Q. And the Miller article that you relied  
8 on for your pass-through formula has several  
9 other formulas for other shape demand curves that  
10 you didn't use.

11 A. I ended up doing a lot of different  
12 demand curves. But the one that I ultimately  
13 used and relied upon was the logit model.

14 Q. Okay. And why did you choose the  
15 formula from the Miller article that was  
16 associated with logit demand?

17 A. Well, hold on. That was a non sequitur.  
18 I -- once I figured out the logit was  
19 the best model at explaining the variation in the  
20 data, that took me to the implied pass-through  
21 rate from the logit model.

22 Q. Understood. And what did you do to  
23 figure out that the -- let me ask it differently.

24 Did you -- did you test the structure of  
25 demand using any other formula besides the



1 formula associated with logit demand?

2 A. Yes.

3 Q. What other structures of demand did you  
4 test?

5 A. I tested linear and I tested constant  
6 elasticity.

7 Q. Okay. And did you describe those tests  
8 in your report?

9 A. No. Because I ultimately didn't rely on  
10 them. The -- they just did not do as -- as good  
11 of a job and explain variations in the data as  
12 the logit model.

13 Q. Okay. And then how about the AIDS  
14 demand? Did you -- in your reports, did you talk  
15 about any test that you did to see whether demand  
16 for apps fit that structure of demand?

17 A. No.

18 Q. Okay. Why not?

19 A. I felt that the logit did such a good  
20 job at explaining variation, that the way to kick  
21 the tires was to try linear and -- and constant  
22 elasticity. These are the three, you know,  
23 primary models. I'd grant you that A -- the AIDS  
24 is also up there, but I felt that I had -- I had  
25 run a sufficient test to convince me that -- that

1 the logit model was giving us the best fit of the  
2 data, and it was giving us -- it lent itself --  
3 through Miller it lent itself to pass-through  
4 rates that were producing numbers that were  
5 reliable and that varied across app categories.

6 And, you know, and as I said before,  
7 logit is a very common system. So I felt very --  
8 I felt very good in -- in using it.

9 Q. Right. But you haven't used any -- you  
10 haven't used the formula from the AIDS demand  
11 from the Miller article that you relied on to  
12 calculate pass-through rates.

13 A. That's true. I have not.

14 Q. Do you know if that formula would  
15 actually solve?

16 A. I'd have to -- I'd have to employ it to  
17 be able to -- to tell you whether or not I could  
18 -- I could get im -- implied pass-through rates.

19 Q. So sitting here today, you don't know  
20 one way or the other.

21 A. I don't.

22

23

24 Q. Okay. Now, logit demand has the  
25 independence of relevant alternatives property?

1 they would land on Microsoft's productivity  
2 package would be higher than if they were to land  
3 on some obscure package within productivity apps.  
4 I mean, it's -- it's very intuitive. It's very  
5 natural.

6 Q. Now, your pass-through formula is based  
7 on logit demand.

8 A. Yes.

9 Q. And one feature of logit demand is that  
10 all goods in the market where demand is being  
11 measured are substitutes.

12 A. I think that's a general -- that is  
13 generally the case. That's fine.

14 Q. Okay. Is it your opinion that all apps  
15 in each Google Play app category are substitutes?

16 A. No. And that's why I invoked this  
17 concept of cluster markets. Like, you could --  
18 you could take Microsoft's Excel and Microsoft's  
19 Word and ask me if they're substitutes, and I  
20 would say at -- at that level, they're not.  
21 But -- but when you think about the fact that  
22 Microsoft and Google are actually competing with  
23 a package of productivity apps, that -- that it  
24 would make sense to think of that as something  
25 more akin to a cluster market the way that we saw

1 in the Staples and Office Depot case, that paper  
2 clips and a ruler aren't necessarily substitutes;  
3 but if the people generally tend to buy those  
4 things from the same place, they can belong in  
5 the same product market.

6 Q. So -- but -- but it's not your opinion  
7 that all apps in each Google Play app category  
8 are substitutes.

9 A. I just gave an example of Excel and Word  
10 as being more -- more of complements, right? But  
11 -- but when you think about the -- the cat -- the  
12 productivity suite that Google is offering, that  
13 -- that's clearly a substitute to what -- what  
14 Microsoft is offering in its productivity suite.

15 Q. Right. So some of the apps in each  
16 Google Play category could be complements,  
17 correct?

18 A. They could be.

19 Q. And some could be substitutes.

20 A. They could be, yes.

21 Q. Right. And you haven't put forth a  
22 model in your report to determine which apps in  
23 each category are complements and which are  
24 substitutes?

25 A. No. And it's not necessary to get the

1 implied pass-through rate.

2 Q. Right.

3 Could you go to Paragraph 78 of your  
4 reply report -- well, actually, let me ask you:  
5 Are you opining that all apps in each category  
6 are part of a cluster market?

7 A. No. You -- you saw in my report. I'm  
8 saying that they don't need to necessarily be a  
9 market, a relevant market, for antitrust  
10 purposes, and I give you a citation for that.

11 I think that if you -- if you really  
12 wanted to -- if you forced it into that box,  
13 which is unnecessary and unnatural, that you  
14 could -- you could get there by -- by  
15 understanding the categories functioning  
16 more like a cluster market.

17 Q. Right. But you're not actually offering  
18 the opinion that all of the apps in each category  
19 are part of a cluster market.

20 A. No. I -- I'm offering the opinion that  
21 -- that everything within the category -- that  
22 the category definitions from Google define the  
23 -- the contours or the arena of competition among  
24 apps in that category.

25 Q. Okay. And, again, let's go to Paragraph

1 Q. Let me -- let me ask a different  
2 question. You haven't calculated what those  
3 switching costs are.

4 A. I haven't calculated it, no.

5 Q. All right. So you ran a regression in  
6 your opening report, correct?

7 A. Well, I ran so many, I'm not sure which  
8 one you're speaking of.

9 Q. So let me -- fair point.  
10 You ran a set of regressions in your  
11 opening report.

12 A. Yes.

13 Q. Okay. Now, those regressions are  
14 testing the elasticity of demand for apps based  
15 on a change in the price of the app, right?

16 A. As instrumented via change in the tax  
17 rate, correct.

18 Q. Okay. Now, the regression you ran in  
19 preparing your opening report isn't measuring how  
20 a service fee change affects the price of an app  
21 or an in-app purchase, right?

22 A. Correct. We've been through this  
23 before. If -- if Google had varied its service  
24 fee [REDACTED]

[REDACTED], I -- I could have employed a

1 different model, but I couldn't given the  
2 restraint.

3 Q. Right. So just -- I -- I understand.  
4 I just want to make sure we're clear about what  
5 your regression does and -- and it doesn't do.

6 The regressions that you ran in your  
7 opening report isn't measuring the effect of the  
8 service fee on the price of the app or the in-app  
9 purchases, right?

10 A. Correct. It's doing something close so  
11 that I can make a prediction about how a change  
12 in the service fee would change the prices.

13 Q. And you haven't run any regression that  
14 measures how a change in the service fee affects  
15 the price of an app or in-app purchases?

16 A. I've -- I haven't -- well, I've tested  
17 and -- and analyzed the regressions that were run  
18 by Dr. Williams and Burtis that -- that purport  
19 to do that or that attempt to do that, but those  
20 experiments are so fatally flawed and botched  
21 that there is no learning to be done. There's --  
22 there's no -- there's no economic knowledge that  
23 can be gleaned from those botched experiments.

24 Q. Right. Now, the prices that developers  
25 charge in the but-for world might depend on

1     these other dimensions that I just gave you --  
2     you know, consistently downward sloping,  
3     statistically significant -- and -- and you're  
4     looking for a tie-breaker that -- that at that  
5     point comparing the R-squared could make sense.

6           Q.     So you're saying that you ran -- you ran  
7     regressions using linear and log-linear demand?

8           A.     Or constant -- we call it "constant" --

9           Q.     "Constant" --

10          A.     -- "elasticity."

11          Q.     "Constant elasticity" demand, and you  
12     saw R-squareds that were lower than the R-squared  
13     you got for logit?

14          A.     Yes. But I don't want you to think that  
15     that was dispositive. That was one of many  
16     dimensions over which I made the -- the call.

17          Q.     Right. But the regressions you ran for  
18     linear and constant-elasticity demand, those  
19     weren't included in the reports or the backup to  
20     your reports that you disclosed, right?

21          A.     I did not turn over those regressions,  
22     but you can -- your -- your economists can run  
23     them for themselves to get confirmation that --  
24     that they don't do as good of a job explaining  
25     that data.



1     that uses a dollar amount of sales tax?

2           A.     Well, in the field -- it's one of the  
3     fields in the transaction data that says "taxes",  
4     and it -- it is -- it is stated in dollars, I  
5     believe, not as percentage. So we get to see  
6     what the relationship is between those changes,  
7     right, as -- as predictive -- how predictive they  
8     are to changes in prices. The fact that they may  
9     be denominated in dollars doesn't mean they don't  
10    come from ad valorem. I'm pretty confident that  
11    they are always -- or that generally -- just to  
12    be safe, they're generally set as a percentage of  
13    revenues.

14          Q.     Understood. But as you input them into  
15    your model regarding the relationship between the  
16    sales taxes and the prices, they were in dollar  
17    terms and not percentage terms?

18          A.     I believe that's the case. I can -- I  
19    can check that out for you in a break, but I  
20    believe that the way that it's entered into the  
21    database is as dollars.

22          Q.     Got it.

23                 Now, going back to your formula for  
24    pass-through, which, again, is essentially a  
25    hundred minus the quantity share of the apps

1 transactions in its category, right?

2 A. That's for the app developer, but I  
3 don't present it that way in the report. I  
4 present it, as you know, at the category level.

5 Q. Understood.

6 A. Okay.

7 Q. But that's the general math of the  
8 formula?

9 A. That's the math.

10 Q. Right. Fair to say that that math will  
11 always produce a pass-through rate, unless the  
12 app developer or -- has a hundred percent of a  
13 Google Play category?

14 A. I think it's fair that -- that you'll  
15 get a positive pass-through rate. You won't  
16 necessarily get a big one, but you'll get a  
17 positive pass-through rate with the exception  
18 of the guy who dominates the field. And, you  
19 know, again, this is -- hopefully this is  
20 intuitive to the non-economist in that -- in that  
21 your share is capturing your dominance in this  
22 arena of competition. And so what the logit  
23 model is telling us is that the more dominant you  
24 are, the less -- the smaller percentage of the  
25 pass -- of a cost saving you share with your --

1 with your client.

2 Q. Right. But just so we're clear, unless  
3 the app has a hundred percent quantity share in  
4 the category, your formula will predict a  
5 positive pass-through rate?

6 A. For a given app developer, that -- that  
7 is correct, yes.

8 Q. Okay. Now, you talked earlier about  
9 the pass-through formula you have, potentially  
10 predicting different rates from month to month or  
11 week to week. We talked about that a little bit.

12 A. Yeah. If you were to measure it on a  
13 monthly basis, there would be some variation that  
14 you wouldn't get if you were to measure it across  
15 the -- the class period. That is correct.

16 Q. Right. And your opinion is that it's  
17 not appropriate to measure it on that short of a  
18 time scale, correct?

19 A. Correct.

20 Q. Right. And what's the economic basis  
21 for why it's inappropriate to measure it on that  
22 week to week or month to month or those sorts of  
23 time frames?

24 A. I don't think that an app developer  
25 is going to revisit its pricing on a -- on a

1 Q. And that amount that is passed through  
2 as a price deduction is [REDACTED] for  
3 in-app purchases of price reduction in the  
4 but-for world?

5 A. Correct.

6 Q. So here you've assumed that the -- for  
7 in-app purchases in the but-for world, the -- all  
8 of the reduction in Google's service fee is a  
9 marginal cost that will affect the price that  
10 developers set in the but-for world?

11 A. Correct.

12 Q. Now -- and in -- in calculating how  
13 prices will be set in the but-for world based on  
14 a reduction of this service fee, again, in the  
15 in-app purchase context, this calculation doesn't  
16 reference the developer's other marginal costs in  
17 any way?

18 A. Correct.

19 Q. Okay. Now, if you could go to Page  
20 -- sorry, again, back to paragraph -- Page 104 of  
21 your report with the formula in Paragraph 225, so  
22 the -- you have this cost term here C star. Do  
23 you see that?

24 A. Yes.

25 Q. And that's C, which are the developer's

1 mean, perhaps that's the percentage, but the  
2 dollar amount depends on what the other marginal  
3 costs are?

4 A. Yeah. But you don't need to. That's  
5 why I expressed it just as C here. I didn't need  
6 to use a dollar for my example. But -- but I can  
7 just tell you, we can do the math here, but as  
8 you toggle between [REDACTED] percent, the delta  
9 on that -- on that coefficient is going to be  
10 [REDACTED], and that should be understood as  
11 a change in percent, right -- change in  
12 percentage points of the boosting power of the  
13 take rate.

14 Q. Understood. I just want to -- I just  
15 want to be clear because I'm going to -- I want  
16 us to just do some math here and see where it  
17 goes, --

18 A. Okay.

19 Q. -- if you'll follow me.

20 So the -- if -- if the developers'  
21 marginal cost is a dollar and the service fee  
22 rate changes from [REDACTED], your  
23 economic model on Page 104 of your report says  
24 that the effective marginal cost will drop by [REDACTED]  
25 [REDACTED]

1           A.     If that's the difference of [REDACTED],  
2     sounds right, yeah, times the cost, I think  
3     that's fair. Yeah, it's the equivalent of, like,  
4     [REDACTED].

5           Q.     Okay. But if you go back to Table 5,  
6     your -- your calculations for damage purposes say  
7     that the reduction in marginal cost is \$[REDACTED],  
8     right? On average, right?

9           A.     Correct.

10          Q.     Okay. So what marginal cost of the  
11     developer besides the service fees does that  
12     [REDACTED] reflect?

13          A.     A different one.

14          Q.     Which one?

15          A.     Oh, whatever the -- whatever the unknown  
16     marginal cost is to the developers on average. I  
17     mean, the beauty of the -- of the logit is that  
18     we don't need to estimate the marginal costs in  
19     order to get to the pass-through rate. But there  
20     is a marginal cost going on in the background,  
21     as the math simplifies when you saw for the  
22     pass-through rate, such that you don't need to  
23     know what it is.

24          Q.     Right. So the logit model in the  
25     formula you've used does not depend in any way on

1 what the other developer's marginal cost is?

2 A. Not a precise estimate of what it is.

3 Just it depends on the fact, I believe, --

4 Q. Right.

5 A. -- that there is a marginal cost.

6 Q. So -- so let's assume that the average  
7 marginal cost of all de -- of all developers was  
8 a dollar --

9 A. Well, why would you assume that when the  
10 price here is at [REDACTED]? Are we going to assume  
11 that -- that the margins are that high on average  
12 for the developers?

13 Q. Well, I mean, to be clear, you haven't  
14 calculated any of this, right?

15 A. I didn't need to calculate it.

16 Q. Okay. And because you didn't need to  
17 you didn't?

18 A. Correct.

19 Q. Okay. So -- but if it were the case  
20 that the average marginal cost for all developers  
21 were a [REDACTED] then the average reduction in  
22 service -- the average reduction in the effective  
23 marginal costs for developers would be [REDACTED]  
24 according to your formula in Paragraph 225 and  
25 not [REDACTED] that you have in Table 5?

1 that's being charged for these transactions here.  
2 So you're -- you're giving -- you're assuming  
3 quite a luxurious margin for the app developer to  
4 make that -- that math hold.

5 Q. Fine, sir. I'm just asking whether, if  
6 that were the case, that the math that I'm giving  
7 you, that the effective reduction in marginal  
8 costs from a [REDACTED] percent service fee to a [REDACTED]  
9 percent service fee for a developer with a dollar  
10 marginal cost would be [REDACTED] cents instead of the  
11 [REDACTED]?

12 A. All I'll -- all I'll grant you is that  
13 if you go to your equation -- your preferred  
14 equation on Page 104 and make the assumptions  
15 that you did with a dollar and the move from [REDACTED]  
16 [REDACTED], the math would suggest [REDACTED] percentage  
17 points of the margin cost. If you assume the  
18 margin cost is [REDACTED], then it would be [REDACTED]  
19 [REDACTED]

20 Q. Right. And so what I'm -- what I'm  
21 -- so you agree with me, then, that if you  
22 actually calculated the average marginal cost for  
23 what -- for a developer on an in-app purchase, it  
24 could change the effective marginal cost paid by  
25 the increase for the developer in an amount



1 that's less than the \$[REDACTED] that you have here in  
2 Table 5?

3 A. No, you don't need to do that under the  
4 logit model. I will grant you that under Page  
5 104, the generalized equation, that had I used  
6 that to estimate my pass-through, that it would  
7 depend on the marginal cost. But knowing that I  
8 couldn't observe the marginal cost, right, I  
9 -- among myriad other reasons that I gave you, I  
10 went with the logit model because I didn't need  
11 to estimate the marginal cost of the developer.

12 Q. Right. So you -- so you went with the  
13 logit model for pass-through that you used in  
14 your report rather than the formula in page -- on  
15 Page 104 that depends on marginal costs because  
16 you couldn't observe the marginal costs?

17 A. No. That wasn't the only reason. It  
18 was another beneficial property of logit that it  
19 doesn't require you to go out and estimate a  
20 variable that might be impossible to observe,  
21 right? And so -- but that's not -- that's not  
22 the only reason or the primary reason why I chose  
23 logit. It just happens to be a beneficial  
24 property.

25 Q. Why would the model in Paragraph 225 not

1     apply to a model of logit demand if the -- if the  
2     model in Paragraph 104 is a generic model?

3           A.     Well, because the logit pass-through  
4     rule states pass-through as a function of  
5     industry concentration and not of cost, and so  
6     when you asked me why doesn't -- you're asking me  
7     basically why isn't the pass-through rate under  
8     logit changing with the change in costs. It  
9     doesn't. It's just a property of the logit  
10    demand. It doesn't make the math on 104 wrong.  
11    It doesn't make the logit wrong. It just -- it's  
12    no longer a function of cost.

13          Q.     So the property of the logit demand  
14    model that you used for your pass-through is that  
15    the price is a function of the concentration and  
16    not of the cost?

17          A.     The pass-through is a function of the  
18    concentration, not of the cost, correct.

19          Q.     All right. What is focal point pricing?

20          A.     Focal point pricing is the notion that a  
21    consumer might focus on the -- on the first digit  
22    before the decimal, as opposed to the last two.  
23    So it explains why a lot of firms end -- end  
24    their prices in 99 cents, or other -- or other  
25    combinations. Just a greater focus on the first

1 -- on the stuff before the decimal place than --  
2 than after the decimal place.

3 Q. Okay. And do you -- focal point pricing  
4 is a well-established concept in economics?

5 A. Sure.

6 Q. And in the real world, many developers  
7 price transactions only at certain focal points?

8 MS. GIULIANELLI: Objection.

9 THE WITNESS: We -- we've -- I've given  
10 you all the stats that I think you could ever  
11 want to see and more, but, you know, we know that  
12 a lot do but a lot don't. You know, [REDACTED] percent  
13 of the top [REDACTED] don't end in 99 cents, right,  
14 which is a big number.

15 BY MR. RAPHAEL:

16 Q. So fair to say, though, that in the real  
17 world some developers price in way that seems  
18 like they're focal point pricing and some  
19 developers don't?

20 A. Given -- given the constraints that  
21 Google imposed on some developers, yes, they  
22 -- you know, they did price at 99 cents.

23 Q. Well, what analysis have you done, sir,  
24 in your reports to determine what effect Google  
25 -- any constraints that Google imposed on

1 BY MR. RAPHAEL:

2 Q. I guess what I'm asking is, is it your  
3 opinion that focal point pricing doesn't explain  
4 any developers' pricing in the actual world?

5 A. No, I think that's too harsh. I think  
6 that focal point pricing is an important  
7 consideration here.

8 Q. Okay. Now, and -- and the price floor  
9 you talked about of setting prices at 99 cents,  
10 that wouldn't affect developers who set their  
11 prices quite a bit above 99 cents?

12 A. That's fair. I think that, when we  
13 looked at the data, it's about -- it's about [REDACTED]  
14 percent of developers were at that 99 cent, so I  
15 agree with you that -- that those would be the  
16 ones who were constrained from -- from moving  
17 downward.

18 Q. Okay. So the other [REDACTED] percent of  
19 developers wouldn't be affected by what you're  
20 calling the price floor that Google had in place?

21 A. Correct.

22 Q. Okay.

23 A. With one caveat in the sense that there  
24 could be spillover effects from a floor being set  
25 at 99 on what the next step up would be, but I

1 out, for the purposes of impact, is to say that  
2 if all app developers within a category achieved  
3 a certain cost reduction by virtue of enhanced  
4 competition and, thereby, lower take rate, how  
5 much of that would be shared with consumers in  
6 the aggregate across the category. And, you  
7 know, what I'm hearing is, oh, my God, have you  
8 ruled out 99-cent things or things that end in 9?  
9 No, we haven't -- we haven't ruled that out. But  
10 we're talking about the share of the costs that  
11 are being saved in the aggregate across a  
12 category. We can allow for 79-cent pricing, we  
13 can allow for 99-cent pricing, 29-cent pricing in  
14 the but-for world. We're not putting any  
15 restrictions on -- on what the price of a  
16 particular app in a particular plan at a  
17 particular point in time are.

18 BY MR. RAPHAEL:

19 Q. Right. So I just want to make sure I  
20 get an answer to my question. So your model for  
21 a pass-through isn't trying to take account in  
22 any specific way for the phenomenon of focal  
23 point pricing?

24 A. I -- I don't -- I don't think that the  
25 mod -- that particular logit estimate of the [REDACTED]

1 percent is accounting or needs to take account.  
2 I think I need to account for it in my overall  
3 opinions about what the but-for world would look  
4 like. But the logit model is just telling us  
5 what the implied pass-through rate is given a  
6 reduction in costs, given the concentration  
7 -- the typical concentration we see within  
8 categories in -- you know, in the app industry.

9 Q. Okay. Your regressions regarding the  
10 logit demand, did they have any fixed effect or  
11 other mechanism to control for focal point  
12 pricing?

13 A. Well, they did use fixed effects. I  
14 don't know if you meant to say that, but they  
15 don't have a separate control variable for focal  
16 point. But it is true, now that you brought this  
17 up, we do have app fixed effects, right? So to  
18 the extent that an app stayed constant at a given  
19 price over time or always ended at 99 -- let me  
20 just say for the record what fixed effects is.  
21 Quite literally, it's controlling for any of  
22 these attributes of the app that are constant  
23 over time. And so if that tendency to want to  
24 end in 99 or 79 or 69 is constant, then, yes, my  
25 regressions control for it.

1 monopoly power.

2 Q. Okay. Now, service fees on platforms  
3 other than Google Play are marginal costs for  
4 developers as well, right?

5 A. The service fee or the take rate charged  
6 by Google to the developer can be understood as a  
7 marginal cost.

8 Q. And when service fees are charged to  
9 developers on other platforms that may compete  
10 with Google Play, those are also properly  
11 understood as marginal costs for the developers?

12 A. Correct.

13 Q. Okay. So if we saw service fees on  
14 other platforms that are lower than Google Play's  
15 service fees, those would be lower marginal costs  
16 to those developers. Fair?

17 A. Fair.

18 Q. Okay. Now, would you predict, then,  
19 that -- well, strike that.

20 In fact, it's true that many developers  
21 do not charge different prices on platforms that  
22 compete with Google Play that offer lower service  
23 fees.

24 A. There are examples of that, sure.

25 Q. And do you know how many developers

1 record. The time is 2:08 p.m.

2 (Recess taken.)

3 THE VIDEOGRAPHER: We're now on the  
4 record. The time is 2:10 p.m.

5 BY MR. RAPHAEL:

6 Q. Now that you've got your microphone  
7 fixed, it's true, according to your report, that  
8 some other app stores charge lower service fees  
9 for some transactions than Google charges on  
10 Google Play?

11 A. Yes. These -- these diminished  
12 competitors, in part by virtue of the challenged  
13 conduct, are charging lower, as economic theory  
14 would predict they would charge lower. How else  
15 would they get someone to switch?

16 Q. Right. And is it the case that all  
17 developers charge lower prices on other app  
18 stores that have lower service fees?

19 MS. GIULIANELLI: Objection.

20 THE WITNESS: Not all, no.

21 BY MR. RAPHAEL:

22 Q. So some developers charge the same price  
23 on other app stores than Google Play where there  
24 are lower service fees?

25 A. I would -- I would assume that's a safe



1 -- yeah, that is a safe assumption that you could  
2 find examples of app prices being the same across  
3 stores under today's, you know, diminished  
4 competition where these rivals aren't really  
5 offering meaningful substitution opportunities.

6 Q. Have you done any analysis in your  
7 reports to determine whether the majority of  
8 developers on the Google Play store and another  
9 app store charged the same or different prices  
10 across stores?

11 A. No, I haven't.

12 Q. Okay. Now, in your report, I think you  
13 note that different PC gaming platforms charge  
14 different service fees?

15 A. Sure.

16 Q. Right? So Microsoft now charges a 12  
17 percent service fee on -- on PC gaming?

18 A. Yes.

19 Q. Okay. And Steam charges more than 12  
20 percent for its PC gaming platform?

21 A. I think I give the percentages in my  
22 report, but I -- I don't recall them being far  
23 off from each other. I think it's a more  
24 competitive marketplace.

25 Q. Right. Well, let's go to -- let's

1 skipped a 2. Let me say it again. 3(d)(2)(c).

2 BY MR. RAPHAEL:

3 Q. Okay. We'll come back to that.

4 A. Okay.

5 Q. Have you reviewed transcripts of any  
6 testimony by any of the developer plaintiffs in  
7 this case?

8 A. Yes. I think I cite some testimony from  
9 some developers. I -- I'm not sure if they're  
10 plaintiffs in the case, but I -- I recall citing  
11 some testimony, at least in my reply, by a  
12 developer.

13 MS. GIULIANELLI: And I -- and I'm just  
14 going to keep in mind the expert stipulation with  
15 respect to the disclosure of materials relied  
16 upon.

17 BY MR. RAPHAEL:

18 Q. Okay. So have you relied on any  
19 developers' testimony in forming your opinions  
20 about how developers would set prices in the  
21 but-for world?

22 A. I don't recall having done that.

23 Q. Okay. Now, what analysis have you done  
24 to determine the extent to which an inability to  
25 steer affected developers from reducing prices in

1 developers.

2 Q. Right. But other than what's in Table  
3 9, have you done any empirical analysis of the  
4 effect on developers' ability or inability to  
5 steer on whether they lowered their prices in  
6 response to lowered service fees?

7 A. Other than 9, I -- I don't -- I haven't  
8 done one, but what you're asking is a bit of a  
9 trick question, which is, in the presence of  
10 steering, we -- in the presence of an  
11 anti-steering restraint, it is very hard to go  
12 out and measure what the effect of steering would  
13 be on -- on pass-through or app pricing.

14 Q. Okay. Now, your opinion is that  
15 directing customers from inside the app  
16 downloaded from the Play Store to options outside  
17 of the Play Store is the most efficient channel  
18 for steering?

19 A. Correct.

20 Q. Okay. Now, what -- what empirical  
21 analysis have you done to support that opinion?

22 A. Yeah. This has been asked and answered,  
23 but I'll -- we'll go back through it again, if  
24 you want.

25 And let me have the question back again,

1 please.

2 Q. Have you done any empirical analysis to  
3 support your opinion that directing customers  
4 from inside the app downloaded from the Play  
5 Store to options outside of the Play Store is  
6 the most efficient channel for steering?

7 A. So I think -- I think it's the same  
8 answer that I gave you this morning, that I  
9 haven't done original empiricism, but I -- I'm  
10 aware that Google has not prevented steering on  
11 billboards, television advertisements and  
12 Internet advertisements, but they have prevented  
13 steering from within the app itself once it's  
14 downloaded on the Play Store. And that tells me  
15 that, to Google, it's the most important channel.  
16 Why would Google block it otherwise, right? So I  
17 feel like it's a very natural inference for an  
18 economist to make that this is the most -- this  
19 is the most efficient.

20 If you -- put it this way: For you to  
21 go any other path would incur new costs that you  
22 wouldn't otherwise incur by steering within  
23 the app store, right? To get someone else's  
24 attention on a billboard, you've gotta pay money.  
25 You don't need to do that when it's inside of

1 your own app.

2 Q. Do you agree that payment systems  
3 that require exiting the app to complete the  
4 transaction aren't reasonable substitutes for  
5 Google Play billing?

6 MS. GIULIANELLI: Objection.

7 THE WITNESS: I didn't understand it,  
8 so --

9 BY MR. RAPHAEL:

10 Q. Are payment systems that would require  
11 exiting the app to complete a transaction  
12 reasonable substitutes for developers or  
13 consumers to using Google Play billing?

14 MS. GIULIANELLI: Same objection.

15 THE WITNESS: I don't know if I have an  
16 opinion here, and I'm just not aware of any  
17 payment processor who requires the customer  
18 to leave the app in order to consummate the  
19 purchase? I just -- I'm just not aware -- I'm  
20 just not aware that that would even -- that is  
21 even a thing. I wasn't aware of that.

22 BY MR. RAPHAEL:

23 Q. Okay. Is there a term in your  
24 pass-through rate formula for the extent to which  
25 developers can steer?

1           A.     No.

2           Q.     Why not?

3           A.     Well, as you know, I ultimately  
4 chose the logit model, and the logit model's  
5 pass-through formula simplifies to a function of  
6 market share, which is not a term for steering.

7           Q.     All right. So the -- the logit  
8 pass-through formula that you used to calculate  
9 the pass-through rates doesn't depend on  
10 steering?

11          A.     I would say that steering ensures the  
12 pass-through is going to be positive. Logit  
13 allows us to estimate precisely what it's going  
14 to be.

15          Q.     Okay. So fair to say, then, that the --  
16 the logit model pass-through formula that you've  
17 used in your report depends on steering?

18          A.     No, I don't think it depends on steering  
19 because we can come up with -- we can come up  
20 with explanations for how pass-through would  
21 occur in the presence of the anti-steering  
22 restraint.

23          Q.     So you -- there's reasons why  
24 steering would occur despite the anti-steering  
25 restrictions?

1           A.     No, there's reasons why pass-through  
2     would occur.

3           Q.     Oh, excuse me. Okay. So there are  
4     reasons why -- why you would expect pass-through  
5     regardless of the anti-steering restrictions?

6           A.     Correct. I think that while it's true  
7     that the anti-steering restrictions make for a  
8     very potent impediment to steering and  
9     pass-through, there are other ways in which  
10    pass-through would occur, even without steering.  
11    If I could, you know, Google has modeled  
12    different worlds, and so I've kind of mimicked  
13    the assumption of where the developer could  
14    choose its payment processor, right? And you can  
15    imagine a world where developers look around at a  
16    whole bunch of payment processors in kind of an  
17    open and unfettered market and go with the  
18    payment processor offering a competitive rate, or  
19    one of the lowest rates, and then competition  
20    among developers in the same category would put  
21    downward pressure on the prices that they charge  
22    to their customers.

23                 So there are -- there are mechanisms  
24    that get you to pass-through and lower prices  
25    outside of steering. But I'll always hold, until

1 I'm blue in the face, that steering is like a  
2 supercharger. It would -- it would -- it would  
3 boost all of these properties.

4 Q. Have you done any analysis to determine  
5 by how much it would supercharge all these  
6 properties?

7 A. No. But -- no. But what I'm assuming,  
8 I mean, at least in my -- when I wrote this  
9 report, I'm assuming that the challenged conduct  
10 is gone, and part of the challenged conduct is  
11 the anti-steering restrictions. And so I'm  
12 confident that there would be pass-through; that  
13 it would be positive. Now the question is,  
14 what's the tool in economics that I can use to  
15 reliably estimate the extent of the pass-through,  
16 and that was the logit model.

17 Q. Right. Now, Google doesn't restrict any  
18 marketing or advertising of other platforms  
19 -- strike that.

20 Google doesn't restrict developers from  
21 marketing or advertising transactions on other  
22 platforms outside of the app that's been  
23 downloaded from Google Play.

24 A. That's correct. There -- there's  
25 -- Google understands that there would be a



1     newfound cost to be incurred by the developer to  
2     advertise in those outside fora, and recognizes  
3     that that would be a less-efficient means of  
4     communicating, or leading to use Google's word,  
5     the customer to a lower-cost platform.

6           Q.     Right. In your reports, have you done  
7     any analysis to determine the profitability of  
8     steering via any channel, whether in app or  
9     outside the app, for any developer?

10          A.     Well, I did -- I give an analysis  
11     -- well, I give a numerical example of how  
12     steering -- remember, this is the one that begins  
13     with the [REDACTED] price --

14          Q.     Right.

15          A.     -- could improve the profitability of a  
16     -- of a developer.

17          Q.     Right. But you haven't done any  
18     analysis of using, say, actual data of the  
19     profitability of steering in any channel for any  
20     developer using actual data?

21          A.     I have, because Table 9 in my initial  
22     report shows steering with -- with price  
23     reductions. And so, presumably, they wouldn't --  
24     these apps would not be charging a lower price on  
25     their website if it weren't profitable to do so.

1           Q.     Well, I'm just saying -- I guess  
2     what I'm asking is -- maybe I'll ask it this  
3     way: Have -- have you done any analysis that  
4     compares the profitability of steering for  
5     developers via in app communications versus  
6     steering using outside of the app communications?

7           A.     I haven't, but I know this: That to go  
8     outside would require a newfound advertising cost  
9     that would not otherwise be incurred if you could  
10    do it in-app. And that would necessarily lower  
11    the profitability of that -- of that steering  
12    relative to steering within the app.

13          Q.     Have you done any empirical analysis in  
14    your report of whether it would be profitable for  
15    any particular developer to reduce prices by a  
16    full focal point?

17          A.     I don't know what that means.

18          Q.     Well, --

19          A.     What's a full focal point?

20          Q.     Well, you told me what -- what's your  
21    definition of a focal point?

22          A.     Well, we talked about how it's focusing  
23    the attention on the left side of the decimal  
24    place so you can kind of go high on the right and  
25    it's not really going to scare off the customers.

1 the play points program?

2 A. The reason why that's the case is that  
3 at [REDACTED] percent or whatever [REDACTED] offering that  
4 Google's making given the impaired competition  
5 that it caused, [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

11 Q. My question was in the actual world,  
12 it's correct that [REDACTED]

[REDACTED]  
14 [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

21 A. I asked the question why bother. [REDACTED]

[REDACTED]  
23 [REDACTED]  
[REDACTED]  
[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] I haven't

studied what percentage redeemed, but when it's

so small -- like, imagine instead of a [REDACTED] it was

[REDACTED], right, and you asked me the

question, Hal, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Q. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] I haven't

studied what percentage have.

Q. Okay. So in your reports, you haven't

identified any model to determine which

1 -- the -- the flip, you know, where it occurs,  
2 but I can -- I can conceive that [REDACTED]  
3 that it just wouldn't make a difference for  
4 consumers.

5 Q. Okay. Now, in your reports have you  
6 identified any model to determine which users  
7 would have signed up for play points in the  
8 but-for world?

9 A. No. I don't need to because what the  
10 model is giving me is what Google would pay in  
11 the aggregate across all consumers in terms of  
12 subsidy. So that [REDACTED] that comes out of the  
13 play points model, and doing by memory, is what  
14 happens in the aggregate. So, it's conceivable  
15 that -- that some consumers aren't contributing  
16 to that -- to that [REDACTED] or some people are  
17 doing it disproportionately, but that is going to  
18 be the average subsidy that comes about via the  
19 -- that if the locus of competition were to occur  
20 on the points side of the market.

21 Q. So the answer to my question is, no, you  
22 -- in your reports you haven't put forth any  
23 model to determine which users would have signed  
24 up for play points in the but-for world?

25 A. I don't think I need to, just to be

1 clear --

2 Q. I'm not asking you whether you need to.

3 A. Okay.

4 Q. So I'm going to ask my question again.

5 A. Okay.

6 Q. In your reports, did you put forth any  
7 model to determine in the but-for world which  
8 users would have signed up for the play points  
9 program?

10 A. That's not what the model is calling  
11 for. I'll be clear, the model wants to know  
12 -- the model is solving for the size of the  
13 subsidy across all consumers, right, and if the  
14 model is telling us [REDACTED] the way to  
15 interpret that -- that -- that parameter is that,  
16 on average, the subsidy offered to consumers in  
17 the but-for world, if the locus of competition  
18 were exclusively on the play points side, right,  
19 would be [REDACTED]

20 Q. Right. And so the model that you put  
21 forward in your report regarding play points  
22 isn't telling us anything about what individual  
23 consumers would do with respect to signing up for  
24 the play points program or using their play  
25 points, correct?

1           A.     I think the model is. I think that at [REDACTED]  
2     [REDACTED] the economic intuition -- well, this is  
3     the intuition that I'm drawing from the model --  
4     is that when the benefit gets so large, that is  
5     going to spur participation and usage in the  
6     system.

7           Q.     Great.

8                     Your -- your testimony here today, sir,  
9     is that you have a model in your reports that can  
10    tell the Court and the jury in this case which of  
11    the members of the putative class would have  
12    signed up for play points and who would have used  
13    them?

14                    MS. GIULIANELLI: Objection to the form.

15                    THE WITNESS: I didn't say that. I said  
16    that if the but-for subsidy were to rise to [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED].

22           BY MR. RAPHAEL:

23           Q.     Okay. So I want to -- I want to be  
24    clear. You have -- your testimony is that in the  
25    but-for world, every member of the putative class

1 would sign up for the play points program and use  
2 their play points?

3 MS. GIULIANELLI: Objection.

4 THE WITNESS: I cannot -- this is the  
5 first time I've been asked that question. I'm  
6 just hearing it afresh, right? I cannot fathom  
7 why a user would say, no, take back -- I was  
8 going to spend [REDACTED] and I realize  
9 you're trying to give me [REDACTED] but, no, I don't  
10 want the [REDACTED] I want to spend the full hundred  
11 myself. It would be crazy -- it would be crazy  
12 to -- to do that.

13 BY MR. RAPHAEL:

14 [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

22 Q. Right. And so your testimony is that if  
23 Google changed the play points rate that you've  
24 put in your report, that every member of the  
25 putative class would have signed up for the play



1 points program and used play points?

2 MS. GIULIANELLI: Objection.

3 THE WITNESS: I think -- I think it's a  
4 fair assumption. Like, the model certainly is  
5 not calling on this, but I think it's a fair  
6 assumption that once it goes up to [REDACTED] that  
7 -- that everyone who is making purchases would  
8 -- would either redeem it or at least enroll so  
9 as to be able -- to be capable of taking the  
10 subsidy at -- at those terms.

11 BY MR. RAPHAEL:

12 Q. That's an assumption, though, that  
13 you're making. It's not what the model tells  
14 you?

15 A. Well, the model spits out, just to be  
16 clear, what the average subsidy is across all  
17 users.

18 Q. Now, you -- would you agree with me that  
19 the counterfactual experiment lies at the heart  
20 of antitrust analysis?

21 A. Sure. I mean, it's an important thing.  
22 It's -- I don't know if it's at the heart, but  
23 you need -- you need to have a counterfactual.  
24 You need to model the counterfactual.

25 Q. Could you describe for me the

1 Q. Right. And, so, therefore, you haven't  
2 done that?

3 A. Correct. Correct.

4 Q. I just want to be clear that in your  
5 model for the but-for world service fee rates,  
6 the pass-through rate, the average pass-through  
7 rate you've calculated, is an input into that  
8 service fee rate model?

9 A. For the two-sided market model, the  
10 -- in the app distribution --

11 Q. Yes.

12 A. -- the pass-through rate is input into  
13 determining how the optimal take rate in the  
14 subsidy model, the subsidy gets chosen, that's  
15 correct.

16 Q. Right. And is that also true for the  
17 combined model?

18 A. That's true for the combined model as  
19 well.

20 Q. And so if the pass-through rate, then --  
21 again, you're not going to agree with this. But  
22 if the pass-through rate were zero, okay, that  
23 your model for the but-for service fee rate would  
24 yield the same rate as in the actual world?

25 A. I don't know if I've gone in and put

1 Q. But it's not determinative?

2 A. I don't think it's determinative. I  
3 just think it's helpful and I think that it was  
4 worth pointing out, and I gave it about as much  
5 attention as it deserves.

6 Q. So I want to just make sure we're clear.  
7 We talked a lot about this formula in Paragraph  
8 224 regarding the profit-maximizing price. This  
9 is Page 104 of your report.

10 A. Yes. You like this formula a lot.

11 Q. I just want to be clear. Have you used  
12 that to -- used that formula to calculate any  
13 pass-through rates in this case?

14 A. No, that was not the formula that I  
15 used.

16 Q. Okay. Now, Google Play has different  
17 storefronts for different countries?

18 A. That's fair.

19 Q. And now as an economist, why do you  
20 think Google offers different storefronts for  
21 different countries?

22 A. Well, Google must think that the  
23 differences in the audience is sufficiently  
24 important so as to warrant the design of a  
25 different storefront. You know, it's expensive

## C E R T I F I C A T E

I do hereby certify that I am a Notary Public in good standing, that the aforesaid testimony was taken before me, pursuant to notice, at the time and place indicated; that said deponent was by me duly sworn to tell the truth, the whole truth, and nothing but the truth; that the testimony of said deponent was correctly recorded in machine shorthand by me and thereafter transcribed under my supervision with computer-aided transcription; that the deposition is a true and correct record of the testimony given by the witness; and that I am neither of counsel nor kin to any party in said action, nor interested in the outcome thereof.

WITNESS my hand and official seal this 13th day of May, 2022.



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Notary Public

1 GOOGLE PLAY STORE ANTITRUST LITIGATION

2 5/12/2022 - HAL SINGER, PH.D.

3 ACKNOWLEDGEMENT OF DEPONENT

4 I, HAL SINGER, PH.D., do hereby declare  
5 that I have read the foregoing transcript, I  
6 have made any corrections, additions, or  
7 changes I deemed necessary as noted on the  
8 Errata to be appended hereto, and that the same  
9 is a true, correct and complete transcript of  
10 the testimony given by me.

11  
12 \_\_\_\_\_  
13 HAL SINGER, PH.D.

\_\_\_\_\_  
Date

14 \*If notary is required  
15

16 SUBSCRIBED AND SWORN TO BEFORE ME THIS

17 \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_.

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20 \_\_\_\_\_  
21 NOTARY PUBLIC  
22  
23  
24  
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